

XXXI. *The prevention of Insect injury by the use of Phenol preparations.* By ELEANOR A. ORMEROD, F.M.S.

[Read November 6th, 1878.]

I FEEL some hesitation in venturing to withdraw your attention for a short time from more scientific matters to that of the *Psila rosæ*, too well known for the injury it causes in our carrot crops, under the name of "rust;" but after noting for many years the means generally used, and, ordinarily, with little success for keeping it in check, I have this year been fortunate enough to stop its ravages so completely that, perhaps, I may be allowed to say a few words on the subject, looking on it as the type of a class of injurious insects very difficult to deal with practically,—whose life, in all but the imago state, being carried on beneath the surface of the earth, show their presence only by its results when it is often too late to apply a remedy, and, generally speaking, difficult to find an application that will destroy the insect without injuring the plant.

On the 19th of June I found the carrots in my garden perishing under the worst attack of *Psila rosæ* that I ever met with. Instead of being simply limited to a number of larval borings towards the extremity of the root, the plants were in some cases killed, in others were destroyed fully half-way up; the larvæ were unusually fine and numerous, and the constantly-increasing injury to the plot might be traced by the daily-altering state of the plants, which were given up as hopeless by the various gardeners I consulted.

It occurred to me that a fluid application I was then experimenting with, known as "Little's Soluble Phenyle," of which the ingredients were stated to be a distillation of tar, similar to creosote, and pine oil, and which I had found injurious to insect life, whilst beneficial to vegetation, might be of service, and after watering the plants for a few days with it in a dilute state, the application took effect thoroughly.

In less than a fortnight the attack had ceased spreading, and some of the infested plants showed signs of recovery;

in another week healthy foliage was showing, contrasting with the deep orange-coloured leaves characteristic of the insect attack to the root, and from that time till the 12th of August, when they were raised for examination, sacrificing good and bad together for comparison, they continued to grow luxuriantly with no return of attack of the "rust" fly.

Taking the roots in the mass, they showed how sudden the check had been to the insect life. Where the grubs had died from the application of the phenyle, whilst there was just sufficient life left in the root to recover, though it was truncated by the loss of the insect-injured portion, it had grown in width, and might be seen as sketched at fig. 1, sometimes with a morsel of the gnawed extremity still attached.

Those that had sprung from seed (even in the very centre of the most infested part), after the application of the "soluble phenyle" were absolutely untouched by the larvæ, and healthy, as also those that had been preserved similarly from attack, and the only notable presence of "rust" was in a root, so far from the experimental application as probably to have escaped the remedy, and the foliage was so exceedingly luxuriant, and clear brilliant green, that the experiment was stated to be quite satisfactory by the gardeners I asked to examine it, not wishing to trust my own opinion.

I should feel little doubt for the future of checking the attack of the rust insect by a timely application, but from some experiments carried on by leaving pupæ of *Otiorynchus sulcatus* in soil soaked with the "soluble phenyle" (little, if at all, diluted), and by which they were only exceptionally injured, it appeared that the larvæ were got rid of either by starvation or the unwholesome state of their food when saturated with the chemical fluid, not by external application; and the question arose, whether phenol compounds present in sufficient quantity to destroy insect life might be objectionable in food roots.

I had, therefore, a proper analysis made of some of the roots, and it appeared by fractional distillation with water that a minute quantity of a tarry volatile substance was separated, this being possibly carbolic acid or a homologue of that substance, the quantity obtained being too small for more precise examination.

The pectin and sugar were stated to be unaltered, and the ash showed nothing beyond what usually exists.

The results showed that the absorbed substance or substances were so small in quantity that, though (in the most extreme cases) perceptible to taste and smell before cooking, the quantity, even in these instances, was not sufficient to make the roots prejudicial to the health; and with regard to the taste, I may mention some cabbages similarly treated, and given to my gardener and his wife for special observation, were pronounced everything that could be wished.

I cannot help feeling a hope that this experiment may be followed up into something of general utility.

In all cases I have found the "soluble phenyle" beneficial to vegetation; and, looking at the degree to which larval health is affected in many cases merely by the difference in the watery or condensed state of the sap, and the general refusal of larvæ to feed at all unless the food is to their taste, it appears that a fluid so thoroughly distasteful as this—not simply soddening from the outside but circulated by the vegetative action exactly in the young and growing tissues most liable to insect attack—might be of much service at hardly appreciable cost, except the wages of a labourer for occasional application, and might even be brought to bear on the *Phylloxera*.